

Chapter 4:

Statutory and Regulatory Mandates, Regulatory Flexibility

The Commonwealth's objective is to develop a biofuels policy that grows the clean energy sector through in-state R&D and production, enhances the environment, and provides economic security by reducing petroleum use and dependency.

The potential economic and environmental benefits of biofuels argue for consideration of regulatory and financial incentives to promote their development and production in Massachusetts. Financial assistance (grants, loans, and tax policy) is discussed in Chapter 6. This chapter focuses on regulatory methods by which the state might encourage the production and use of biofuels in an environmentally beneficial manner.

There are two basic regulatory approaches for encouraging alternatives to petroleum-based fuel used principally for transportation and secondarily for space heating:

1. content mandates for fuel purchased or sold; and
2. a Low Carbon Fuel Standard, which sets overall limits on greenhouse gas emissions but does not mandate the content of any specific fuel or technologies used.

Both approaches move us away from petroleum and toward lower-emission, renewable fuels. The Low Carbon Fuel Standard, however, does so in a way that is technology neutral, allowing the market to drive the development of alternative fuels at lowest cost. Although content mandates offer important benefits in the short run, in its hearings across the state the Advanced Biofuels

Task Force heard strong support for moving toward a Low Carbon Fuel Standard as the means of promoting innovative solutions to our fuel needs.

Content Mandates

The federal Energy Independence and Security Act of 2007 requires "renewable fuel" used in the U.S. to rise from 4.7 billion gallons in 2007 to 36 billion gallons in 2022, "advanced biofuel" to rise from 0.6 billion gallons in 2009 to 21 billion gallons in 2022, and cellulosic biofuel to rise from 0.1 billion gallons in 2010 to 16 billion gallons in 2022. Renewable fuels must be produced from renewable biomass, replace other transportation fuel, and achieve at least a 20% reduction in greenhouse gas emissions on a lifecycle basis for "new facilities." (Expansion of existing facilities is exempt from the greenhouse gas criterion.) Advanced biofuel excludes ethanol derived from corn starch, and must yield at least a 50% lifecycle reduction in greenhouse gas emissions, while cellulosic biofuel must achieve a 60% reduction. The law contains provisions allowing the EPA administrator to reduce both the percentage greenhouse gas reductions and the volumes of production required. The three categories are not additive—cellulosic fuel counts as part of advanced fuel, and both count as part of the renewable fuel mandate.¹

Mandates for use of E85 fuel (85% ethanol) have been passed in some states, mainly ones where corn is a significant local crop. Iowa has a renewable fuel standard that requires

Governor Patrick's *Leading By Example* Executive Order, signed April 18, 2007, instructed state agencies to switch to 3% biobased fuels for all use of Number 2 heating oil, beginning with the winter of 2007-08. The Order requires 10% biofuels by 2012.

Biodiesel mandates have also been passed by some states, but generally go into effect only when in-state production of the fuel is sufficient to meet mandated demand. Biofuel mandates in the Northeast and Mid-Atlantic states are more limited—generally restricted to fuel use by state fleet vehicles.

10% of motor fuel in the state to be replaced by ethanol and biodiesel in 2009, rising to 23% in 2018. Oregon requires gasoline to be blended with 10% ethanol, but only after in-state ethanol production reaches 40 million gallons a year. Similarly, Louisiana law requires that 2% of gasoline consist of ethanol from in-state feedstocks, but only once in-state production reaches 50 million gallons per year.

Biodiesel mandates have also been passed by some states, but generally go into effect only when in-state production of the fuel is sufficient to meet mandated demand. In Louisiana, diesel fuel is required to contain 2% biodiesel once in-state production reaches 10 million gallons. Minnesota requires that all diesel fuel contain 2% biodiesel, without regard to in-state production. Oregon will require 2% biodiesel once supplies from the Pacific Northwest (Oregon, Washington, Idaho, and Montana) reach 5 million gallons a year; the requirement rises to 5% once supplies reach 15 million gallons a year. Washington State will require a 2% biodiesel blend once in-state feedstocks are sufficient to meet the requirement, rising to a 5% blend once in-state feedstocks reach 3% of supply.²

Biofuel mandates in the Northeast and Mid-Atlantic states are more limited—generally restricted to fuel use by state fleet vehicles, in large part due to federal requirements for state fleets under the 2005 Energy Policy Act. New York has extensive policies, but these were recently re-evaluated in light of concerns over the lifecycle greenhouse gas impacts of particular fuels. A task force led by New York's lieutenant governor has indicated that policies will be put on hold pending development of a comprehensive biofuels strategy.³ At present, New York requires that state vehicles use E85 whenever possible, and that at least 10% of fuel used in the state fleet be biodiesel by 2012.

Connecticut requires at least 50% of new cars and light-duty trucks in the state fleet to use alternative fuels, increasing to 100% in 2012.

Rhode Island requires 75% of state vehicle acquisitions be vehicles powered by alternative fuel, fulfilling this requirement mostly by compressed natural gas-fueled vehicles. New Jersey requires all new buses bought by NJ Transit to be powered with alternative fuels, and Maryland requires state-owned flex-fuel vehicles to use at least 50% alternative fuel.⁴

In Massachusetts, Governor Patrick's "Leading By Example" Executive Order, signed on April 18, 2007, instructs state agencies to use 3% bio-based fuels for all heating that currently uses Number 2 heating oil, beginning with the winter of 2007-08, and 10% biofuels by 2012.⁵ Implementation of the Order is under way, but full information on compliance by state agencies is not yet available.

Administration and Finance Bulletin #13, issued August 11, 2006, instructs the Executive Office of Administration and Finance and the Division of Energy Resources to set minimum percentage requirements for state agency use of E85 in state-owned flex-fuel vehicles. It also sets requirements for use of biodiesel blends in state diesel vehicles, beginning at 5% in Fiscal 2008 and increasing to 15% in Fiscal 2010. Current reporting indicates that the requirements are only being partly met due to lack of available fuel. Bulletin #13 also says that 3% biodiesel blends will be used in heating oil in state buildings, with waiver provisions.

Legislation filed on November 5, 2007, by Governor Patrick, along with Senate President Therese Murray and House Speaker Salvatore DiMasi, would provide support for cellulosic ethanol and biodiesel. Cellulosic ethanol would be exempted from the state's gasoline tax (see further discussion in Chapter 6), while minimum requirements would be set for use of biodiesel blends in both diesel motor fuel and Number 2 heating oil sold in the state. B2 (2% biodiesel) would be required beginning in July 2010, ramping up to B5 in 2014. The Division of Energy Resources would have authority to delay the implementation dates based on

“lack of supply, lack of blending facilities, or unreasonable cost.” Biodiesel supplies meeting the mandate would have to come from sustainably grown feedstocks, as determined by the Division.⁶

Various concerns have been expressed in relation to the proposed biodiesel mandates, including the lack of distribution infrastructure in the state (see Chapter 5); possible price impacts on consumers for both diesel transportation fuel and home heating fuel; possible shortages of oil-crop feedstocks that meet the greenhouse gas reduction criteria (see Chapter 2); impacts on small distributors, particularly in the home heating fuel sector⁷; and that by supporting a particular fuel it does not meet the technology-neutral principle of a Low Carbon Fuel Standard. In relation to the last concern, New Generation Biofuels, a Houston-based company currently developing a facility in Massachusetts, testified that the bill would not recognize the advantages of its product, which is designed to be used in 100% (“neat”) form rather than blended with petroleum diesel.⁸ The Massachusetts Oil Heat Council, however, has stated its support for a biodiesel content requirement for heating oil.⁹

A variety of measures could address the above-stated concerns. One option would be to provide state support for installation of biodiesel distribution infrastructure (see Chapters 5 and 6). Another, more complex option that could address several of these issues including difficulties for small distributors, would be to create a “cap and trade” system, under which fuel supplied in the state would have to meet the mandated biodiesel percentages on average, but not every gallon sold would have to do so. Suppliers who exceed the mandate—say, by selling B20 fuel—could sell “credits” to suppliers who don’t have any biodiesel in their products. New Generation Biofuels would benefit under this scenario by having large numbers of credits available to sell, making their product more economical and helping to bring it into widespread use—precisely the point of a market-

based regulatory system. Such a system would move Massachusetts in the direction of a Low Carbon Fuel Standard, though in this case only with regard to diesel fuels. However, it would add substantial complexity to the regulatory process, including oversight of participating companies—a cost that must be carefully considered.

Low Carbon Fuel Standard

The state of California has developed a Low Carbon Fuel Standard, which puts all non-petroleum vehicle fuel sources on an equal footing—not just biofuels, but also electricity and hydrogen fuel cells.

The Low Carbon Fuel Standard results from California’s overall mandate to reduce greenhouse gas emissions (to 1990 levels by 2020 and 80% below 1990 levels by 2050), codified in Assembly Bill 32, and from an Executive Order creating the Low Carbon Fuel Standard as one method to achieve the goals of this legislation.¹⁰ The fuel standard mandates that the “carbon intensity”—lifecycle greenhouse gas emissions per unit of energy delivered—of vehicle fuel in California be reduced 10% by 2020. This does not necessarily guarantee that total vehicle greenhouse gas emissions will fall, since increases in total use of fuel could cancel out reductions in carbon intensity.¹¹

The California Air Resources Board is currently in the midst of developing regulations to implement the Low Carbon Fuel Standard. It is anticipated that the requirement would be imposed at the “top” of the consumption chain, on importers or distributors of petroleum fuel into the state. The Low Carbon Fuel Standard would not require every gallon of fuel used in the state to have 10% lower carbon content.



Rather, it would require that all fuel used in the state result in 10% lower emissions. Thus, a fuel distributor could meet the requirement

by selling some cellulosic ethanol, which, over its lifecycle, is estimated to yield 60% lower greenhouse emissions per unit of delivered energy than gasoline, while continuing to sell mostly gasoline. Moreover, the Board is looking to implement the Low Carbon Fuel Standard as a “cap and trade” system. This

is analogous to the Northeast’s Regional Greenhouse Gas Initiative for electric power plants.

Professor Daniel Sperling of the University of California-Davis, who co-authored California’s studies on the Low Carbon Fuel Standard and is now a member of the California Air Resources Board, testified at the Advanced Biofuels Task Force’s hearing on January 17, 2008. He argued that there is great uncertainty concerning which technologies will prove to be the “winners” for powering motor vehicles and that Massachusetts should adopt a technology-neutral policy, creating a durable framework for

the state and industries to rely on when making investment decisions. Dr. Sperling spoke against providing mandates for particular fuel options and testified that state incentives should be performance-based, related to the amount of greenhouse gas reduction a technology provides.

At this time, it is uncertain which fuels and other power sources will best fulfill the Low Carbon Fuel Standard. That is appropriate for a policy designed to stimulate the competitive marketplace to yield the most economical method of meeting greenhouse-gas and petroleum-use reduction goals. It is possible, for example, that using biomass to generate electricity, which then powers vehicles through the use of plug-in hybrid cars and trucks, will be more effective at reducing greenhouse gases than converting the biomass into liquid fuels. California’s technical study finds that as much as half of its 10% reduction in carbon intensity could be met with electric-drive vehicles.¹² Table 4.1 shows a range of strategies identified for meeting California’s fuel standard.¹³

California does not know at this time whether there is enough biomass and other renewable energy available to fulfill its 10% reduction



Table 4.1: Possible Low Carbon Fuel Strategies	
Low Carbon Fuel Strategy	Description
E10 (10% ethanol, 90% gasoline by volume)	Increase blending of ethanol from today's 5.7 percent average by volume to 10 percent.
E85 (85% ethanol, 15% gasoline by volume)	Sell high blend ethanol (85 percent ethanol, 15 percent gasoline) for use in flex-fuel vehicles.
Switch to Low-Carbon Ethanol	Switch to ethanol made from cellulosic materials (e.g., agricultural waste, switchgrass) that have 4-5 times lower GHG emissions than today's corn-based ethanol.
Electricity	Pure battery electric vehicles or plug-in hybrid vehicles that can be recharged from the electricity grid.
Hydrogen	Used in zero-emitting fuel cell vehicles or internal combustion engine cars modified.
CNG, LPG	Compressed Natural Gas and Liquefied Petroleum Gas burned in modified internal combustion engine cars.
Other biomass based fuels	For example, BP and DuPont are developing biobutanol as a possible additive and Chevron is exploring petroleum-like products synthesized from biomass (so-called "biocrude")
Other?	Future strategies to be developed by fuel providers and outside innovators.

requirement. It is also unknown whether an equivalent target, or a different one, would be achievable through a Low Carbon Fuel Standard in Massachusetts or throughout the Northeast.

What is clear is that a Low Carbon Fuel Standard, while constituting a “mandate” for reducing petroleum use in powering vehicles, does so in a technology neutral manner that lets the market identify opportunities to meet the mandate at lowest cost. It therefore has lower risk of failing to achieve its goals or of imposing high costs than do mandates that specify usage of particular fuels such as ethanol or biodiesel, or other specific technologies such as all-electric or fuel-cell vehicles.

Besides California, other states and some Canadian provinces are considering adoption of a Low Carbon Fuel Standard or have already done so. In 2007, the provinces of Ontario and British Columbia signed agreements to join California in implementing its fuel standard.¹⁴ Florida Governor Charlie Christ has voiced intentions for his state to adopt such a standard.¹⁵ In December 2007, at a conference sponsored by the National Governors Association, regional caucuses put forth recommendations for policy on biofuels, vehicle efficiency, and reducing vehicle miles traveled. A priority recommendation from the Mid-Atlantic/Northeast caucus was adoption of a Low Carbon Fuel Standard, and the Southwest/Midwest caucus stated as a priority “develop[ing] a low-greenhouse-gas vehicle program...”¹⁶

It is widely agreed that adoption of a Low Carbon Fuel Standard on a regional basis could be more effective and impose lower regulatory costs in each state (and possibly Canadian province) involved than would separate laws in one or more states. Fuel refiners and wholesale distributors, on whom the emissions requirements would probably be imposed, supply fuel on a regional basis, with distribution flows commonly going between states at the

retail level. It could be challenging to track the average carbon content of fuel going to a single state. In addition, there could be substantial “leakage” problems if one state attempted to do a Standard on its own, as distributors shifted higher-carbon supplies to neighboring states that lack a Standard. Given the growing biofuels industry in the Commonwealth, Massachusetts can take a leadership role in developing a regional Low Carbon Fuel Standard.

In the Northeast’s cold climate, where space heating is a major energy-use sector and a major source of greenhouse gas emissions, it might also make sense to move beyond California’s vehicle-only Low Carbon Fuel Standard to treat equally all the possible uses of biomass as an energy source. Besides powering vehicles by conversion into a liquid fuel or used to generate electricity, biomass can also be made into a liquid fuel substitute for heating oil or as a solid fuel burned directly for space heating. In the spirit of technology neutrality, public policy could encourage the use of biomass on a performance basis, rewarding reductions of greenhouse gas emissions whether they occur in the transportation sector or in home heating. Such an expansion of the Low Carbon Fuel Standard could yield lower-cost emissions reductions and help make Massachusetts a pioneer in the economy-wide regulation of greenhouse gas emissions.

Improvements to Regulatory Flexibility

There are a number of technologies being developed to chemically, mechanically, or biologically produce advanced biofuels from waste feedstocks, where shift of land use from food to fuel is not an issue and so the risks of large carbon releases are minimized (described more fully in Chapter 3). Technologies span the full continuum of development from research facility to pilot scale production to commercially viable facilities.

With a Low Carbon Fuel Standard, government will not pick winners. Fuel providers will choose how they reduce the carbon intensity of their products, from options such as blending low-carbon biofuels into conventional gasoline, selling low-carbon fuels such as hydrogen, or buying credits from providers of other low-carbon fuels (such as low-carbon electricity or natural gas). This allows businesses to identify new technologies and new strategies that work for them and for their customers.

—Alex Farrell and Daniel Sperling, “Getting the Carbon Out,” *San Francisco Chronicle*, May 18, 2007

Technology developers seeking to show that they can meet performance standards, produce fuels that meet specifications, demonstrate technical and economic feasibility, or optimize operating conditions may seek to operate for a limited time (usually less than one year) under pilot conditions.

Facilities desiring to test the use of advanced biofuels and blends will want to ensure that, for a temporary period, they can properly evaluate benefits, emissions, or operational and maintenance issues before making a fuel switch from petroleum based fuels. Therefore, making pilot demonstrations easy for interested facilities is important.

While many regulations allow these tests to occur for limited periods, a more comprehensive analysis and structure may be needed to encourage demonstrations and remove any barriers. Scaling up from pilot projects or operating for longer periods of time will require state agency review and permits.

Recommendations

1. Prioritize efforts to achieve near-term implementation of a regional, technology-neutral, and performance-based Low Carbon Fuel Standard (LCFS). Position Massachusetts as a leader in this regional development. Given the uncertainty of regional coordination, however, the Commonwealth should also move forward without delay in designing a Massachusetts-specific LCFS that other states and provinces can potentially adopt. The Standard should include lifecycle greenhouse gas reduction standards, as discussed in Chapter 2 of this report on Energy and Environmental Lifecycle, and should reward companies for performance-based results in achieving such reductions.
2. Consider incentives to promote the best uses of sustainably harvested biomass, whether as a replacement for transportation fuels or in other energy applications, such as a liquid fuel substituting for heating oil or as a solid fuel used directly for space heating and/or electricity generation. This would move the state closer to being technology-neutral, searching for the most cost-effective means of reducing petroleum use and greenhouse gas emissions.

3. While a Massachusetts Low Carbon Fuel Standard is being developed, implement transitional, carefully targeted mandates, such as requirements for minimum percentages of biodiesel in motor and heating fuel. Mandates should require that the fuels yield substantial lifecycle greenhouse gas reductions, including direct and indirect impacts such as those on land use, while not increasing the release of other pollutants; should be limited, such as by being tied to in-state production of the feedstocks and by phasing out as a Low Carbon Fuel Standard comes into existence. Mandates should be as flexible and technology-neutral as possible. Use of a trading system for meeting the requirements should be considered, although the regulatory complexities this would add must be weighed carefully.
4. The state should ensure that temporary, pilot scale biorefineries are allowed to proceed after review of appropriate environmental safeguards and evidence that the pilot's results will be useful if it succeeds. Analysis of potential contaminants contained in or produced from the processing of waste products such as construction and demolition waste, the organic fraction of municipal solid waste, and biosolids from wastewater treatment plants should be required. MassDEP should review its regulatory authority to determine whether revisions are needed to allow pilot scale waste-to-fuel production. MassDEP should assist in the review of pilot scale projects (whether or not they need a permit) to ensure that, when a proponent seeks approval for a commercial project, those permits can be issued in a timely manner.
5. The state should support the demonstration of operational, maintenance, and environmental impacts from the use of renewable fuels made from waste in commercial boilers or turbines. Funding for the purchase of biofuels and to oversee tests done at state facilities may be needed. State environmental agencies should adopt reasonable reporting requirements for those deciding to burn advanced fuels. The continued use of existing permitted fuel, if the advanced biofuel is unavailable, should be allowed.
6. Further research and analysis should be done to evaluate the benefits and costs of policies to support biofuels development through a regulatory framework, including those in (3) above, on an expedited timeline.



Chapter 4 Endnotes

1. “Energy Security Through Increased Production of Biofuels,” Title II of HR6, “Energy Independence and Security Act of 2007, found at <http://thomas.loc.gov>.
2. “Custom Query” results from legislative database of the federal Department of Energy’s Alternative Fuels and Advanced Vehicles Data Center, accessed January 2008.
3. “Clean, Secure Energy and Economic Growth: A Commitment to Renewable Energy and Enhanced Energy Independence,” The First Report of the Renewable Energy Task Force to Lieutenant Governor David A. Paterson, State of New York, Feb. 2008.
4. From database of state biofuels incentives, developed by Economic Development Research Group for Massachusetts Advanced Biofuels Task Force (ABTF), version as of 2/14/2008.
5. “Executive Order 484: Leading by Example—Clean Energy and Efficient Buildings,” Governor Deval Patrick, 4/18/2007.
6. House 4364, An Act Furthering the Biofuels Clean Energy Sector, filed November 7, 2007.
7. See testimony of Michael J. Ferrante on behalf of the Massachusetts Oilheat Council at the Jan. 17, 2008 ABTF hearing in Boston.
8. Testimony of Connie Lausten on behalf of H2 Diesel, at ABTF hearing in Boston, 1/17/08.
9. Michael Ferrante, President, Mass. Oilheat Council, testifying at ABTF hearing, 3/11/2008.
10. Executive Order S-01-07, by the Governor of the State of California, 1/18/2007.
11. See “A Low-Carbon Fuel Standard for California, Part I: Technical Analysis,” and “Part 2: Policy Analysis,” Alexander E. Farrell, Daniel Sperling, et al., May and August 2007.
12. “A Low-Carbon Fuel Standard for California, Part 1: Technical Analysis,” Alex Farrell and Daniel Sperling, May 7, 2007, page 5.
13. “White Paper: The Role of a Low Carbon Fuel Standard in Reducing Greenhouse Gas Emissions and Protecting Our Economy : Executive Summary,” California Air Resources Board, 1/9/2007.
14. “Ontario and California Sign Historic Accord On Low-Carbon Fuel Standard, Collaborate On Cancer Research,” press release from Ontario Premier’s Office, 5/30/2007; “Message from Environment Minister Barry Penner,” British Columbia Ministry of Environment, Feb. 2007.
15. “Schwarzenegger Applauds Florida for Adopting California’s Tailpipe Emissions Standards, Aggressive Environmental Protection Policies,” press release from California Governor’s Office, 7/13/2007.
16. “Securing A Clean Energy Future. Greener Fuels, Cleaner Vehicles: A State Resource Guide,” National Governors Association, Feb. 2008, Table 7, “Top Participant Recommendations from Regional Breakout Session,” page 27.